An Introduction to Reactive Power Compensation for Wind Farms

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Abstract

The paper summarises the refereed contributions of seven articles reviewed for publication in the IJETP Special Issue on "Reactive compensation for wind farms". The main goal of the special issue is to provide a forum to exchange information on the reactive power compensation requirements for wind farms and introducing possible price mechanisms for today's deregulated power industry. Uncompensated reactive power causes stress on the hosting utility grid as well as added expenses, which create in difficulties for power purchasing agreements from independent wind energy producers. Wind power producers need to comply with the hosting utility grid interconnection standards, e.g., voltage and frequency, as well as to provide controllable active and reactive sources of power. Active power supply is mainly dependent on the potential of wind power produced and the turbine design. Reactive power demand on the other hand depends on the conversion devices and the recovered power quantity fed to the grid. Static Var Compensators (SVC), Unified Power Quality Conditioners (UPQC), Unified Power Flow Controllers (UPFC), and the Distributed Static Synchronous Compensators (DSTATCOM) are all new emerging devices aimed at regulating the reactive power requirements. The excellent controllability of these devices has paved the way to flexible and dynamic controllers that are capable of regulating the flow of active and reactive power components. These devices are now suggested for the control of the reactive power requirement of wind generators. Studies have demonstrated acceptable voltage stabilisation results. This has increased the penetration level of wind power into existing distribution networks in many countries.